

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (original): A sensor comprising a microfluidic channel and an electronic sensing device on a first substrate, and a second substrate bonded to the first substrate so as to close the microfluidic channel, wherein a functional part of the electronic sensing device is exposed at the surface of the microfluidic channel.
2. (original): A sensor according to claim 1 wherein the exposed functional part of the electronic sensing device is organic.
3. (original): A sensor according to claim 2 wherein the exposed functional part of the electronic sensing device is a polymer.
4. (currently amended): A sensor according to ~~any preceding claim~~ claim 1 wherein the microfluidic channel is formed by embossing.
5. (currently amended): A sensor according to ~~any preceding claim~~ claim 1 wherein the exposed functional part of the electronic sensing device is insoluble in water.

6. (currently amended): A sensor according to ~~any preceding claim~~claim 1 wherein the functional part is a part on whose properties the electrical characteristics of the device are dependent.
7. (currently amended): A sensor according to ~~any preceding claim~~claim 1 wherein an electrical property of the exposed functional part of the electronic sensing device is sensitive to environmental conditions within the channel.
8. (original): A sensor according to claim 7 wherein the environmental conditions are temperature.
9. (original): A sensor according to claim 7 wherein the environmental conditions are the presence of a species to be sensed.
10. (currently amended): A sensor according to ~~any preceding claim~~claim 1 wherein the electronic sensing device is a transistor.
11. (currently amended): A sensor according ~~any preceding claim~~to claim 1 wherein the exposed functional part of the electronic sensing device is an insulating layer.

12. (currently amended): A sensor according to claim 11 ~~as dependent on claim 10~~ wherein the electronic sensing device is a transistor and the exposed functional part of the electronic sensing device is a gate dielectric layer of the transistor.
13. (currently amended): A sensor according to ~~any of claims 1 to 10~~ claim 1 wherein the exposed functional part of the electronic sensing device is a conducting layer.
14. (currently amended): A sensor according to claim ~~13 as dependent on claim 10~~ 13, wherein the electronic sensing device is a transistor and wherein the exposed functional part of the electronic sensing device is a gate electrode of the transistor.
15. (currently amended): A sensor according to ~~any of claims 1 to 10~~ claim 1 wherein the exposed functional part of the electronic sensing device is a semiconducting layer.
16. (currently amended): A sensor according to claim 15 ~~as dependent on claim 10~~ wherein the electronic sensing device is a transistor and wherein the exposed functional part of the electronic sensing device is an active semiconducting layer of the transistor.
17. (currently amended): A sensor according to ~~any preceding claim~~ claim 1 wherein the height of the channel is 1mm or less.

18. (currently amended): A sensor according to ~~any preceding claim~~claim 1 wherein the height of the channel is 20μm or less.
19. (currently amended): A sensor according to ~~any preceding claim~~claim 1 wherein the width of the channel is 1mm or less.
20. (currently amended): A sensor according to ~~any preceding claim~~claim 1 wherein the width of the channel is 20μm or less.
21. (currently amended): A sensor as claimed in ~~any of claims 10 to 20~~claim 10 ~~as dependent on claim 10~~, wherein the transistor is a vertical-channel field-effect transistor.
22. (original): A sensor comprising a first organic substrate having a microfluidic channel and an electronic sensing device located therein, and a second substrate bonded to the first substrate so as to close the microfluidic channel.
23. (original): A sensor according to claim 22 wherein the second substrate is an elastomer.
24. (currently amended): A sensor according to claim 22 ~~or claim 23~~ wherein a further microfluidic channel is located in the second substrate.

25. (currently amended): A sensor according to ~~any of claims 22 to 24~~claim 22 wherein a conducting part of the electronic sensing device is exposed at the surface of the microfluidic channel.
26. (original): A sensor according to claim 25 wherein the conducting part is organic.
27. (original): A sensor according to claim 26 wherein the conducting part is PEDOT/PSS.
28. (original): A sensor according to claim 27 for sensing the presence of glucose in the microfluidic channel.
29. (currently amended): A sensor according to ~~any of claims 22 to 28~~claim 22 for detecting the pH level of a substance in the microfluidic channel.
30. (original): A sensor comprising a microfluidic channel and a pair of electrodes of an electronic sensing device, wherein the microfluidic channel and the pair of electrodes are defined in a single operation.
31. (original): A sensor as claimed in claim 30 wherein the said operation is embossing.

32. (currently amended): A sensor according to claim 30 ~~or 31~~ wherein the microfluidic channel is located in an organic substrate.
33. (currently amended): A sensor according to claim 30 ~~to 32~~ wherein current flowing between the electrodes is sensitive to environmental conditions within the channel.
34. (original): A sensor according to claim 33 wherein the environmental conditions are temperature.
35. (original): A sensor according to claim 34 wherein the environmental conditions are the presence of a species to be sensed.
36. (currently amended): A sensor as claimed in ~~any of claims 30 to 35~~claim 30, wherein said electrodes form source and drain electrodes of a field-effect transistor.
37. (original): A sensor as claimed in claim 36 wherein said field-effect transistor is a vertical-channel field-effect transistor.
38. (currently amended): A sensor as claimed in ~~any of claims 1 to 37~~claim 1 further comprising one or more other electronic devices that are integrated onto the first substrate and wherein the other electronic devices are electrically connected to the electronic sensing device.

39.(original): A sensor as claimed in claim 38, wherein at least one of said other electronic devices performs a signal amplification function.

40.(original): A sensor as claimed in claim 38, wherein at least one of said other electronic devices performs a memory function.

41.(original): A sensor as claimed in claim 38, wherein at least one of said other electronic devices performs a calibration function.

42.(original): A method for producing a sensor, the method comprising the steps of: forming a body comprising an electrically conductive layer; and embossing the body to define a microfluidic channel and a pair of electrodes, the pair of electrodes being exposed at the surface of the channel.

43.(original): A method as claimed in claim 42 wherein the step of defining said pair of electrodes comprises microcutting the electrically conductive layer.

44.(currently amended): A method as claimed in claim 42 ~~or claim 43~~ further comprising the step of depositing over the body a layer of a semiconductive material.

Preliminary Amendment
National Stage of PCT/GB2004/001135

45.(original): A method as claimed in claim 44 further comprising the step of depositing over the layer of semiconductive material a layer of an insulating material.

46.(original): A method as claimed in claim 45 further comprising the step of depositing over the layer of insulating material a layer of a conductive material.

47.(original): A sensor comprising a microfluidic channel and an electronic sensing device, wherein an insulating part of the electronic sensing device is exposed at the surface of the microfluidic channel.